NON-PUBLIC?: N
ACCESSION #: 9411030127
LICENSEE EVENT REPORT (LER)

FACILITY NAME: POINT BEACH NUCLEAR PLANT, UNIT 1 PAGE: 1 OF 7

DOCKET NUMBER: 05000266

TITLE: INADVERTENT EMERGENCY DIESEL GENERATORS START, LOSS OF TWO STATION BATTERY CHARGERS, AND UNIT 2 LOSS OF DECAY HEAT REMOVAL
EVENT DATE: 09/27/94 LER #: 94-010-00 REPORT DATE: 10/25/94

OTHER FACILITIES INVOLVED: PBNP UNIT 2 DOCKET NO: 05000301

OPERATING MODE: N POWER LEVEL: 100%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(i)
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: CURTIS A. CASTELL, SENIOR ENGINEER-LICENSING TELEPHONE: (414) 221-2019

COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: EF COMPONENT: 27 MANUFACTURER: A500
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On September 27, 1994, Unit 1 was operating at full power and Unit 2 was in cold shutdown. The gas turbine was to be used as the sole power source for the Unit 2 4160 volt supply buses (A03 and A04) for a short period of time, to establish cross-ties to the Unit 1 4160 volt supply buses, A03 and A04. The control operator, operating the gas turbine, incorrectly manipulated the controls by lowering speed and voltage of the gas turbine when speed should have been raised. Voltage on the Unit 2 4160 volt system was reduced and reached the degraded voltage relay setpoint. At 0223 hours, the degraded voltage condition caused actuation of the degraded voltage relays for Unit 2, which initiated opening of the normal safeguards buses supply breakers for Unit 2. The emergency diesel generators automatically started and provided power to the Unit 2

safeguards buses. The immediate corrective actions included the restoration of the two station battery chargers, decay heat removal for Unit 2, and off-site power to Unit 2 via the 4160 volt supply buses cross-ties from Unit 1. The electrical distribution system was restored and other equipment that tripped-off during the loss of power was recovered. All the required equipment operated properly. Unit 1 continued to operate at full power and Unit 2 remained in cold shutdown during this event.

END OF ABSTRACT

EVENT DESCRIPTION

On September 27, 1994, Unit 1 was operating at full power and Unit 2 was in cold shutdown. At approximately 0200 hours, the control room operators were performing steps in Procedure SMP 1157, 2X-04 Tap Change, Rev. 0, dated Sept. 22, 1994, to isolate the 2X-04 low voltage station auxiliary transformer in preparation for changing the transformer tap settings. The gas turbine was to be used as the sole power source for the Unit 2 4160 volt supply buses (A03 and A04) for a short period of time, to establish cross-ties to the Unit 1 4160 volt supply buses, A03 and A04.

The gas turbine (G-05) was started, synchronized with off-site power, and operated in minimum load control. The responsible engineer and operations personnel held a pre-job briefing to prepare for the cross-tie of the unit supply buses and isolation of the Unit 2 low voltage station auxiliary transformer. The procedure directed the operators to press gas turbine manual load control button and adjust the gas turbine output to 2 MW, 0 MVAR.

At this point, the gas turbine was about to be used as a power source, via the gas turbine controls in the control room, to allow the synchronization of the Unit 1 and Unit 2 4160 volt buses. This was being done to isolate the Unit 2 low voltage station auxiliary transformer X-04 to perform a tap change that would raise the output voltage by about 2%. The tap change was being performed to improve the plant electrical distribution system voltage response during a degraded voltage situation.

The use of the gas turbine in this manner is normally not necessary, because the Unit 1 and Unit 2 4160 volt electrical distribution systems are normally supplied from the same source, off-site power, which is readily able to be synchronized without adjustment. The Unit 1 and Unit 2 4160 volt systems were at different voltages at this time because the

Unit 1 X-04 low voltage station auxiliary transformer tap settings had been raised by about 2%, approximately 6 months earlier, during the Unit 1 refueling outage.

At approximately 0220 hrs, the operators disabled 13.8 KV fast bus transfer by placing one of the 13.8 KV tie breakers, H52-21, in pullout. At 0222 hrs, the operators opened the breaker from off-site power, H52-30, which isolated the normal (off-site) power supply for Unit 2. This placed the gas turbine in an islanded power supply condition supplying power to Unit 2.

The gas turbine system engineer in the gas turbine building observed the gas turbine immediately go from the synchronized condition at 2.0 MW, 60.0 HZ, and 0 MVAR to 2.75 MW, 59.5 HZ, and 1 to 2 MVAR. At this point, the speed of the gas turbine should have been raised to 60.0 HZ and voltage raised to 13.8 KV. The procedure being used directed the operator to maintain the gas turbine generator speed and voltage.

The control operator operating the gas turbine manipulated the controls to attempt to adjust load to 2 MW and 0 MVAR. Speed and voltage were reduced by the operator. Voltage on the Unit 2 4160 volt system was reduced and reached the degraded voltage relay setpoint. At 0223 hours, the degraded voltage condition caused actuation of the degraded voltage relays for Unit 2 which initiated opening of normal safeguards buses supply breakers for Unit 2, A52-76 for A05 and A52-70 for A06. The emergency diesel generators, G-01 and G-02, automatically started and provided power to the Unit 2 safeguards buses, A05 and A06.

The following equipment tripped-off due to the loss of voltage: Residual heat removal on Unit 2, Battery Chargers D-08 and D-107, and the Unit 2 non-safeguards 480 volt buses (B-01 and B-02). Residual heat removal was restored in approximately 2 minutes (RCS temperature increased from 110 to 116 degrees F). The D-08 and D-107 battery chargers were restored within 11 minutes.

The gas turbine continued to operate and supply power to the 13.8 KV system, the Unit 2 X-04 low voltage station auxiliary transformer, and the Unit 2 4160 volt supply buses A03 and A04. The operators completed cross-ties between the Unit 1 and 2 4160 volt supply buses (A03 and A04), by aligning the Unit 2 buses to be supplied from the operating G-01 and G-02 emergency diesel generators and using the diesel generators as the synchronizing power source.

After the cross-ties of the 4160 volt supply buses were completed, the emergency diesel generators were secured. Off-site power was reconnected to the 13.8 KV buses and the gas turbine, G-05, was secured. Power was also restored to Unit 2 480 volt non-safeguards buses and other non-essential loads.

All the required equipment operated properly. Unit 1 continued to operate at full power and Unit 2 remained in cold shutdown during this event.

CAUSES

A root cause evaluation was performed for this event. The results of the root cause evaluation conclude that the operator adjusted the gas turbine in a manner that was not appropriate for the situation. The operator lowered speed and voltage, when conditions required speed and voltage to be maintained or increased. Contributing factors to this cognitive error included:

1. The procedural steps for islanding the gas turbine were confusing. Just prior to islanding the gas turbine, the procedure directs the operator to adjust the gas turbine to 2 MW and 0 MVAR. The appropriate procedural steps should have directed equalization of the gas turbine power output with the Unit 2 loads that it would supply when islanded.

2. There was a lack of communication between personnel in the gas turbine building and the control room. The gas turbine control panel in the gas turbine building has speed indication which is not available at the control room control panel. Direct communication would have drawn the operator's attention to the need to increase speed earlier.

3. There are human engineering deficiencies on the control room gas turbine control panel. The control panel does not have speed indication and the speed and voltage control switches are the opposite of expectation (a clockwise turn is a "lower" signal verses a clockwise turn expected to be a "raise" signal).

4. Some operators are not skilled with islanded operation of the gas turbine generator at Point Beach.

CORRECTIVE ACTIONS

The immediate corrective actions included the restoration of residual heat removal and the battery chargers and reconnection of off-site power to Unit 2 via the 4160 volt supply buses (A03 and A04) cross ties from Unit 1. The electrical distribution system was restored and equipment that tripped-off during the loss of power was recovered.

The long term corrective actions include improvements to address the contributing factors to the cognitive error listed above. The corrective actions for this event focus on preparing for situations in which the use of the gas turbine in an islanded power source mode may occur again, such as in a station blackout.

1. Perform an evaluation of the need for human engineering improvements at the gas turbine control panels in the control room and in the gas turbine building. This evaluation will be completed by February 1995, and if necessary, modification requests will be initiated to install any needed improvements.

2. The loss of all AC power and gas turbine operating procedures will be reviewed and changed as necessary to include lessons learned from this event. The gas turbine is the alternate AC power source for station blackout. The loss of all AC power procedures direct the use of the gas turbine during a station blackout. The reviews of these procedures will determine if additional guidance would improve these procedures for using the gas turbine as an alternate AC power source and for other islanded operation of the gas turbine. These reviews will be completed by March 1995.

Additionally, training will be conducted as part of the implementation of the changes associated with the corrective actions listed above.

SAFETY ASSESSMENT

The 4160 volt safeguards buses, A-05 and A-06, provide power for the safety-related and some non-safety-related equipment. Various loads automatically trip-off due to an undervoltage condition to prevent overloading the associated emergency diesel generators. The Unit 2 loads that tripped-off during this event were: Station Battery Chargers D-107 and D-08, Motor Control Centers B-21, 2B-31, and B-33, and the 480 volt B-03 to B-01 and B-04 to B-02 bus tie breakers.

The D-06 station battery is normally continuously charged by the D-08 station battery charger. The D-105 station battery is normally continuously charged by the D-107 station battery charger. The loss of

the D-08 and D-107 battery chargers caused the D-06 and D-105 station batteries to begin discharging. The station batteries are sized to carry the maximum expected DC loads for one hour. The battery chargers for D-06 and D-105 were restored in less than 15 minutes. Tables 8.2-1 and 8.2-2 of the PBNP FSAR show that the battery charger is restored after the injection phase of the Loss of Coolant Accident which is approximately one half hour. Therefore, the DC battery system remained operable during this event.

The loss of residual heat removal during cold shutdown on Unit 2 caused a temperature rise in the reactor coolant system of about 6 degrees, from

110 to 116 degrees F. The rapid recovery of residual heat removal for Unit 2 stopped the temperature increase well before any significant safety consequences could occur.

Some safety-related equipment is automatically started by sequencing circuitry following restoration of power to the bus. Service Water Pumps P-032A, P-032B, P-032C, P-032D, and P-032E all started automatically by the sequencing circuitry. The remaining service water pump, P-032F, did not automatically sequence because work was being performed on the Unit 2, Train "A," safeguards sequence time delay relays. Two service water pumps are sufficient to support the operation of Unit 1 and maintain cold shutdown on Unit 2.

The degraded voltage protection circuitry operated properly and performed its intended function to protect electrical loads in the plant electrical distribution system from malfunctions caused by operation at low voltage.

COMPONENT AND SYSTEM DESCRIPTION

Off-site power for Point Beach is supplied by four-345 KV transmission lines that are terminated in a five section bus in a common switchyard for both units. The off-site power is transformed to 13.8 KV then to 4160 volts via two station auxiliary transformers (X-03) and two low voltage station auxiliary transformers (X-04), one pair for each unit. There is also a 13.8 KV, 20 MW gas turbine available for peaking and as an alternate AC power source for Station Blackout.

The electrical distribution system at Point Beach has connections that allow the low voltage station auxiliary transformer for one unit to be isolated by using cross-ties to the other unit.

The degraded voltage relays detect the presence of lower than acceptable

voltage levels. This causes the disconnection of the safety-related 4160 volt buses from the preferred source (off-site), which results in the starting of the emergency diesel generators and connection of the emergency diesel generators to the safety-related 4160 volt buses to restore adequate voltage. The degraded voltage relays were installed in the early 1980's in response to an NRC generic letter dated June 2, 1977.

The IEEE Standard 803A-1983 component identifier for this event is: 27, Undervoltage Relay.

The IEEE Standard 805-1984 system identifiers for this event include:

Medium-Voltage Power System EA
DC Power System Class 1E EJ
Emergency Onsite Power Supply System EK

REPORTABILITY

This Licensee Event Report is provided pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specifications" and 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." A 4-hour notification to the NRC was made at 0429 hours in accordance with 10 CFR 50.72(b)(2)(ii), "Any event or condition that results in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."

SIMILAR OCCURRENCES:

The following Licensee Event Reports describe the inadvertent actuation of an Engineered Safety Feature:

Unit 1 or common

LER 91-006 Inadvertent Start of Emergency Diesel Generator
LER 92-003 Inadvertent Start of Emergency Diesel Generator Due to Personnel Error
LER 93-007 Inadvertent Emergency Diesel Start and Loss of a Station Battery Charger
LER 94-009 Inadvertent Emergency Diesel Start and Loss of a Station Battery Charger

Unit 2

LER 84-005 Inadvertent Start of Emergency Diesel Generator
LER 84-006 Inadvertent Start of Emergency Diesel Generator
LER 84-007 Inadvertent Start of Emergency Diesel Generator
LER 92-007 Inadvertent ESF Actuation as a Result of Improper Surveillance Testing

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VPNPD-94-113
NRC-94-078

October 25, 1994

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Gentlemen:

DOCKETS 50-266 AND 50-301
LICENSEE EVENT REPORT 94-010-00
INADVERTENT EMERGENCY DIESEL GENERATORS START,
LOSS OF TWO STATION BATTERY CHARGERS,
AND UNIT 2 LOSS OF DECAY HEAT REMOVAL
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed is Licensee Event Report 94-010-00 for Point Beach Nuclear Plant, Units 1 and 2. This report is being submitted in accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specifications" and 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the reactor protection system (RPS)." This report describes a situation that caused a loss of off-site power to the Unit 2 safeguards buses.

Please contact us if there are any questions.

Sincerely,

Bob Link
Vice President
Nuclear Power

CAC/jg

Enclosure

cc: NRC Regional Administrator, Region III
NRC Resident Inspector

A subsidiary of Wisconsin Energy Corporation

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